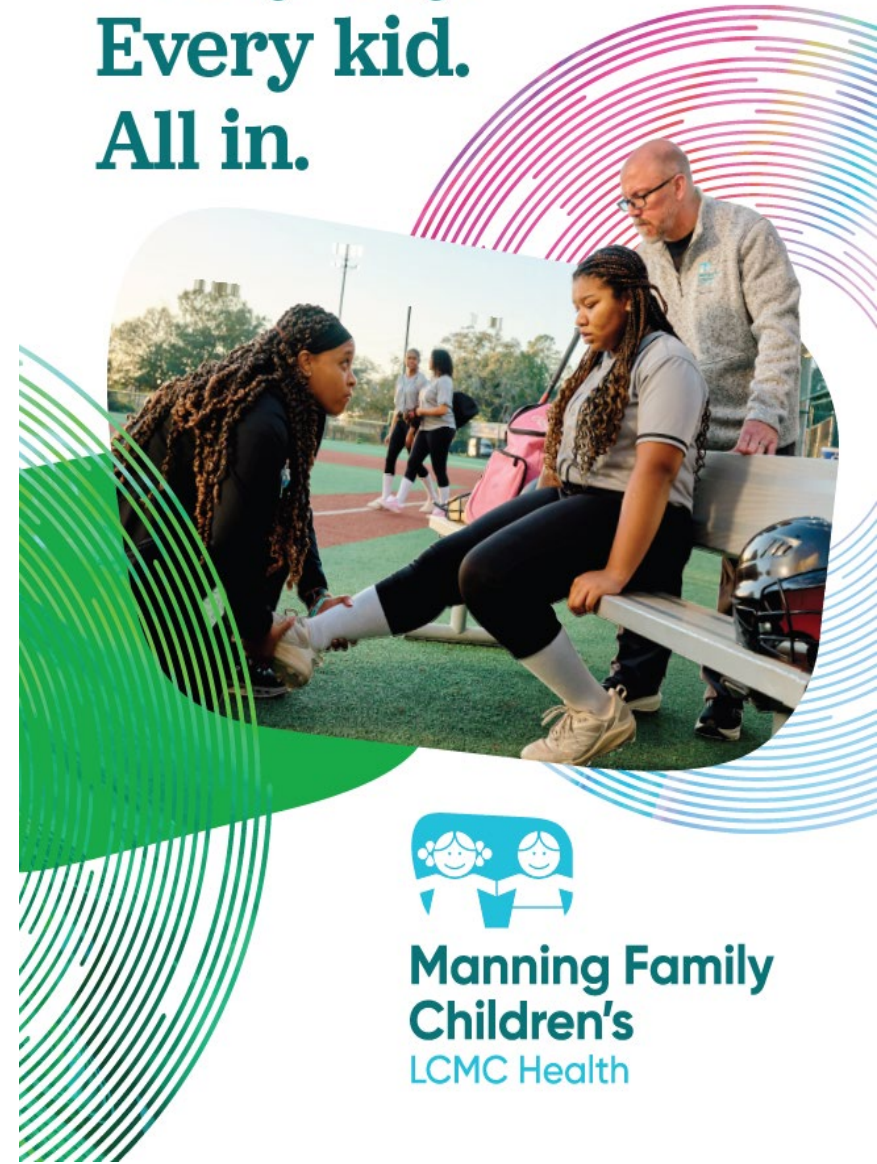


# Heat, Head, Heart

Tony Gonzales, MD  
Manning Family Children's

07.21.2026

Every day.  
Every kid.  
All in.



**Manning Family  
Children's**  
LCMC Health



# Walk On/Walk Off



<https://www.lhsaa.org/sports-medicine>

# EAPs (Emergency Action Plan)

**EAP's are a required part of every school's sports program.**

- Require knowledge of:
  - Access to practice and game areas and directions to that area
  - Who is responsible for what (patient/equipment)
  - Who calls whom and what to say
  - Who is responsible for injury assessment when a physician or trainer is not available.
  - Where are the AED's and First Aid equipment
- The Post Action Plan
- Practice!

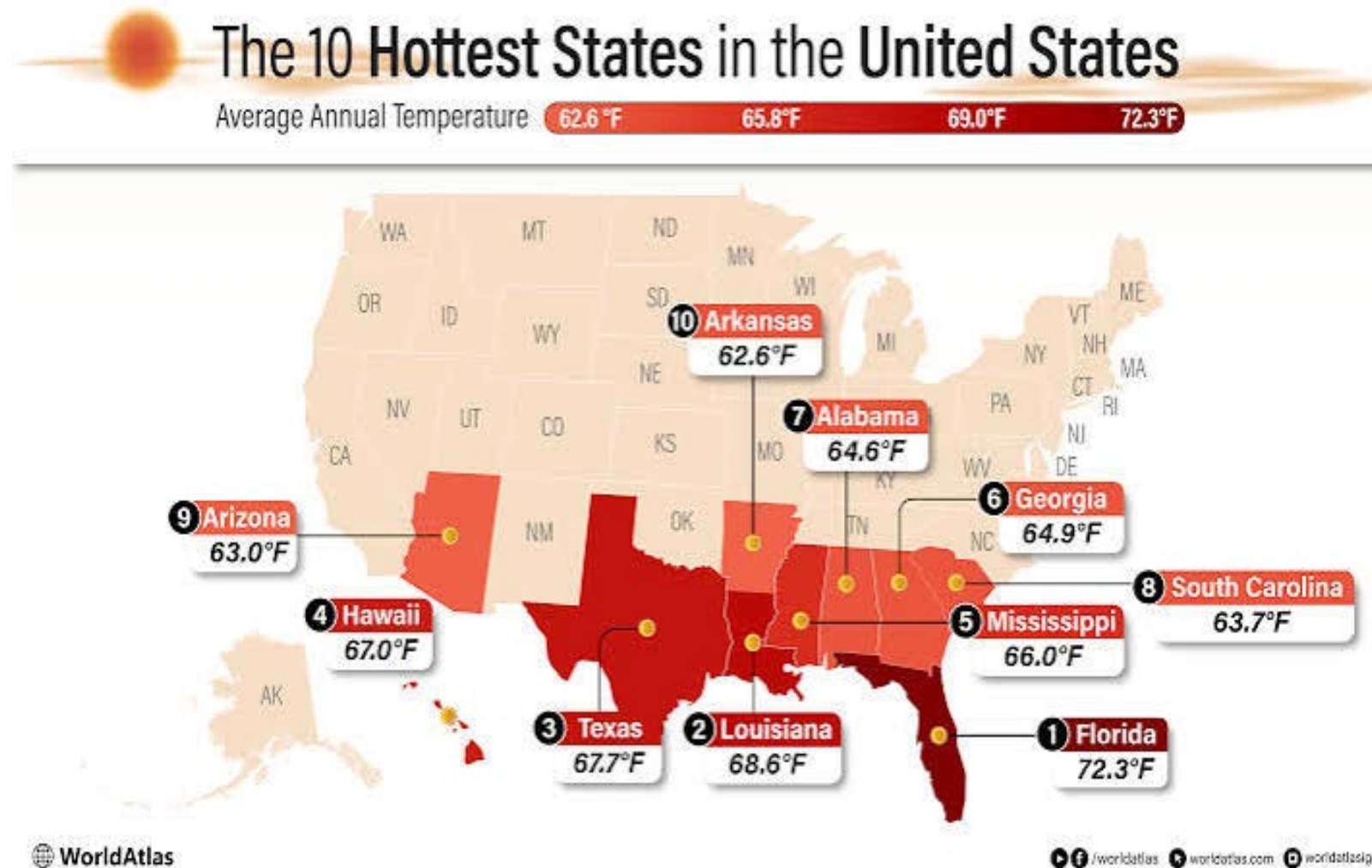


# Heat





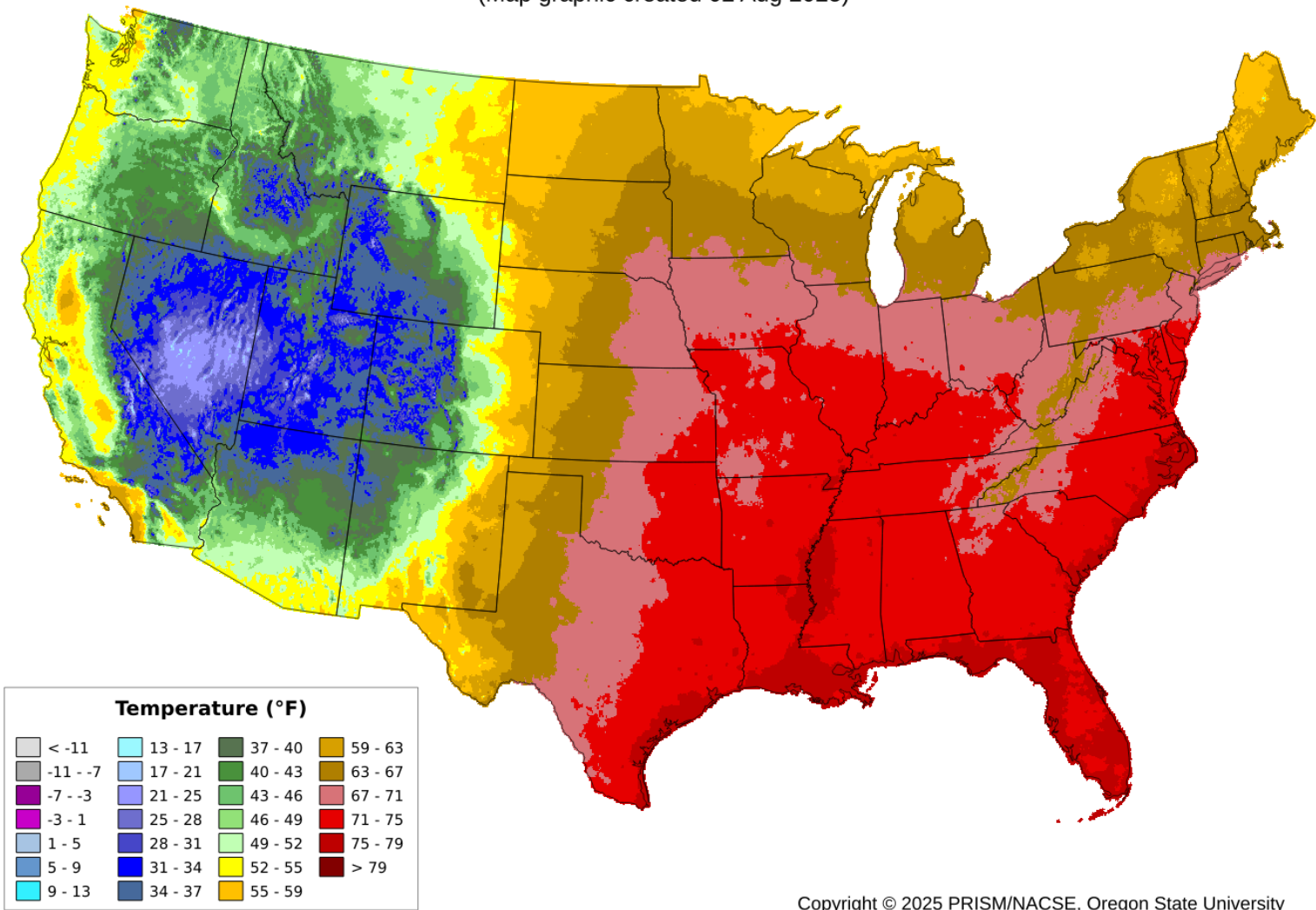
# Top 10 Hottest States in the United States



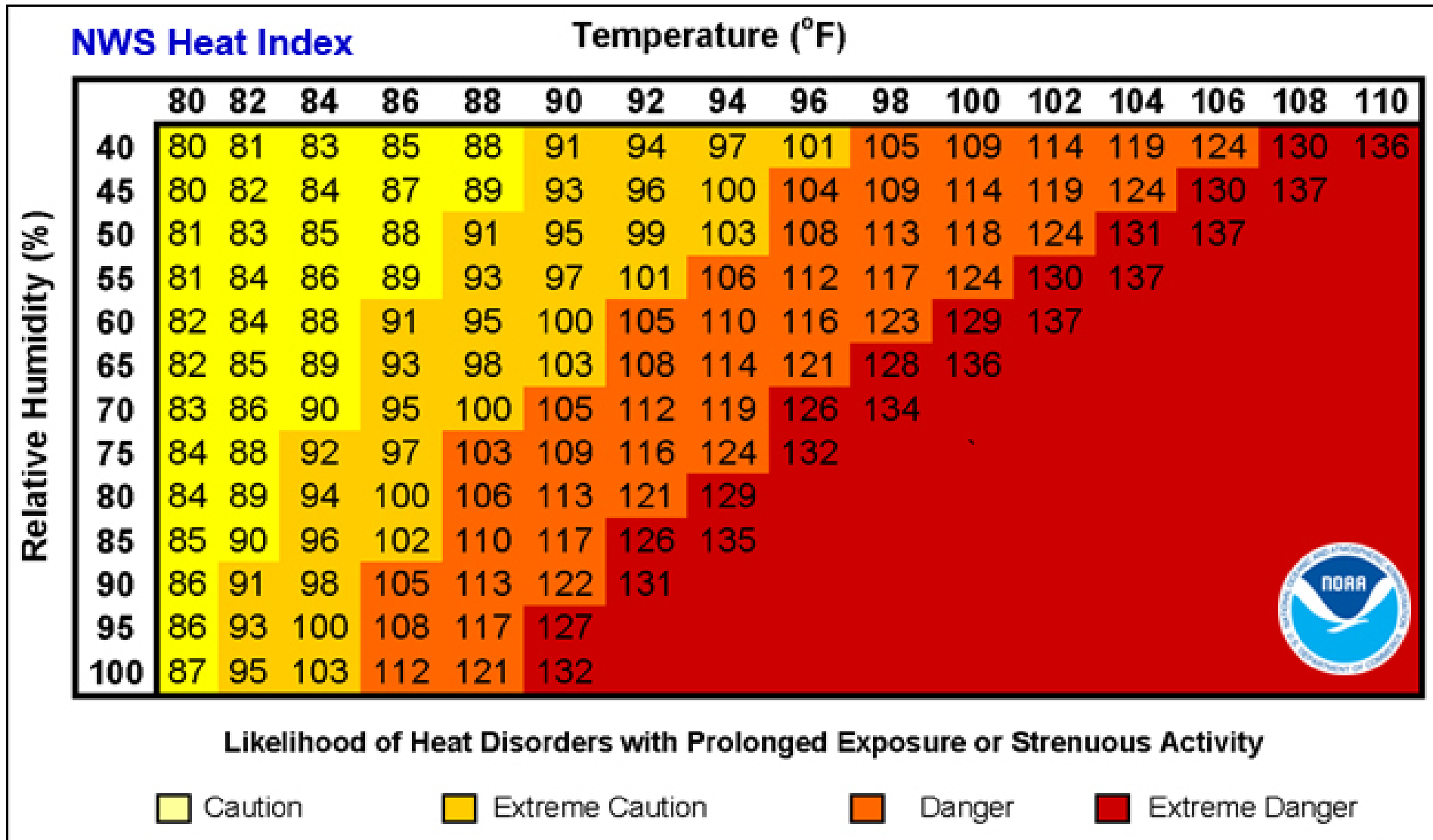
1. Florida
2. Louisiana
3. Texas
4. Hawaii
5. Mississippi
6. Georgia
7. Alabama
8. South Carolina
9. Arizona
10. Arkansas

# Highest Humidity

Average Daily Mean Dew Point Temperature: Jul 2025  
Period ending 7 AM EST 31 Jul 2025  
(Map graphic created 02 Aug 2025)



# Heat Index



# Wet Bulb Globe Temperature

On-site Wet Bulb measurements are the gold standard

| Wet Bulb Globe Temperature (WBGT) from Temperature and Relative Humidity                                                                                                                                                                                           |                                   |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Relative Humidity (%)                                                                                                                                                                                                                                              | Temperature in Degrees Fahrenheit |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    |                                   | 68.0 | 71.6 | 75.2 | 78.8 | 82.4 | 86.0 | 89.6 | 93.2 | 96.8 | 100.4 | 104.0 | 107.6 | 111.2 | 114.8 | 118.4 | 122.0 |
|                                                                                                                                                                                                                                                                    | 0                                 | 58.6 | 60.9 | 64.3 | 65.5 | 67.7 | 69.9 | 72.1 | 74.3 | 76.4 | 78.5  | 80.6  | 82.6  | 84.7  | 86.6  | 88.6  | 90.5  |
|                                                                                                                                                                                                                                                                    | 5                                 | 59.6 | 62.1 | 65.6 | 67.0 | 69.3 | 71.7 | 74.0 | 76.4 | 78.6 | 80.9  | 83.1  | 85.3  | 87.5  | 89.9  | 92.1  | 94.2  |
|                                                                                                                                                                                                                                                                    | 10                                | 60.7 | 63.3 | 66.9 | 68.4 | 70.8 | 73.3 | 75.8 | 78.2 | 80.7 | 83.0  | 85.5  | 88.0  | 90.3  | 92.8  | 95.1  | 97.6  |
|                                                                                                                                                                                                                                                                    | 15                                | 61.7 | 64.5 | 68.1 | 69.6 | 72.2 | 74.8 | 77.4 | 80.0 | 82.6 | 85.2  | 87.8  | 90.2  | 92.8  | 95.4  | 98.0  |       |
|                                                                                                                                                                                                                                                                    | 20                                | 62.7 | 65.6 | 69.4 | 70.9 | 73.6 | 76.3 | 79.2 | 81.8 | 84.5 | 87.1  | 89.8  | 92.5  | 95.2  | 97.8  |       |       |
|                                                                                                                                                                                                                                                                    | 25                                | 63.8 | 66.7 | 70.5 | 72.2 | 75.1 | 77.8 | 80.6 | 83.4 | 86.2 | 89.0  | 91.8  | 94.6  | 97.4  |       |       |       |
|                                                                                                                                                                                                                                                                    | 30                                | 64.8 | 67.6 | 71.7 | 73.4 | 76.3 | 79.2 | 82.1 | 84.9 | 87.8 | 90.8  | 93.6  | 96.6  | 99.4  |       |       |       |
|                                                                                                                                                                                                                                                                    | 35                                | 65.6 | 68.6 | 72.7 | 74.6 | 77.5 | 80.5 | 83.5 | 86.4 | 89.4 | 92.4  | 95.3  | 98.3  |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 40                                | 66.7 | 69.6 | 73.8 | 75.7 | 78.8 | 81.8 | 84.8 | 87.8 | 90.9 | 94.0  | 97.0  |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 45                                | 67.5 | 70.6 | 74.8 | 76.8 | 79.9 | 83.0 | 86.1 | 89.2 | 92.3 | 95.4  | 98.6  |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 50                                | 68.4 | 71.5 | 75.8 | 77.8 | 81.1 | 84.1 | 87.4 | 90.5 | 93.7 | 96.9  |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 55                                | 69.3 | 72.4 | 76.7 | 78.8 | 82.1 | 85.3 | 88.5 | 91.9 | 95.1 | 98.3  |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 60                                | 70.1 | 73.3 | 77.7 | 79.8 | 83.2 | 86.4 | 89.8 | 93.1 | 96.3 | 99.6  |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 65                                | 70.9 | 73.8 | 78.6 | 80.9 | 84.2 | 87.5 | 90.8 | 94.1 | 97.5 |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 70                                | 71.7 | 75.0 | 79.5 | 81.7 | 84.9 | 88.6 | 91.9 | 95.3 | 98.6 |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 75                                | 72.4 | 75.9 | 80.3 | 82.7 | 86.1 | 89.6 | 92.9 | 96.4 |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 80                                | 73.2 | 76.7 | 81.2 | 83.6 | 87.1 | 90.4 | 93.9 | 97.4 |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 85                                | 74.0 | 77.4 | 82.0 | 84.5 | 88.0 | 91.5 | 94.9 | 98.5 |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 90                                | 74.7 | 78.2 | 82.9 | 85.3 | 88.9 | 92.3 | 95.9 | 99.4 |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 95                                | 75.5 | 78.9 | 83.6 | 86.1 | 89.6 | 93.2 | 96.8 |      |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 100                               | 76.1 | 79.7 | 84.4 | 86.9 | 90.5 | 94.1 | 97.7 |      |      |       |       |       |       |       |       |       |
| NOTE: This chart is calculated using temperature and humidity, assuming a very clear sky (maximal solar load), and atmospheric pressure of 1ATA (760 mmHg). Chart A was developed by Professor Yoram Epstein to be used in Ariel's Checklist for hikers in Israel. |                                   |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |

| Heat Stress Category (WBGT)                 | Moderate Work   |                       | Hard Work                                                             |                       |
|---------------------------------------------|-----------------|-----------------------|-----------------------------------------------------------------------|-----------------------|
|                                             | Work/Rest Cycle | Water Intake Per Hour | Work/Rest Cycle                                                       | Water Intake Per Hour |
| <b>White</b><br>≤76.9°F<br>(≤24.9°C)        | 60/15 MINUTES   | 300 ml<br>(1/3 qt)    | 40/20 MINUTES                                                         | 500 ml<br>(1/2 qt)    |
| <b>Green</b><br>77-81.9°F<br>(25-27.7°C)    | 60/15 MINUTES   | 750 ml<br>(3/4 qt)    | 40/20 MINUTES                                                         | 1000 ml<br>(1 qt)     |
| <b>Yellow</b><br>82-84.9°F<br>(27.8-29.4°C) | 40/20 MINUTES   | 1000 ml<br>(1 qt)     | 30/30 MINUTES                                                         | 1000 ml<br>(1 qt)     |
| <b>Red</b><br>85-88.9°F<br>(29.5-31.6°C)    | 30/30 MINUTES   | 1000 ml<br>(1 qt)     | <b>Exercise is forbidden.<br/>Very high risk for heat casualties.</b> |                       |
| <b>Black</b><br>≥89°F<br>(≥31.7°C)          |                 |                       | <b>Exercise is forbidden. Very high risk for heat casualties.</b>     |                       |





# Is Heat a Problem?

- There are **9,000** heat related illnesses/yr in HS athletes
- There are average of **751** heat related deaths/year in the U.S.
- There is an average of **one high school and one college athlete a year that dies** during conditioning from the heat
- Larger position players, players with cardiac conditions, and sickle cell patients are more vulnerable.
- **97% of fatalities in football are linemen.**



# Contributing Factors to Heat Related Illnesses

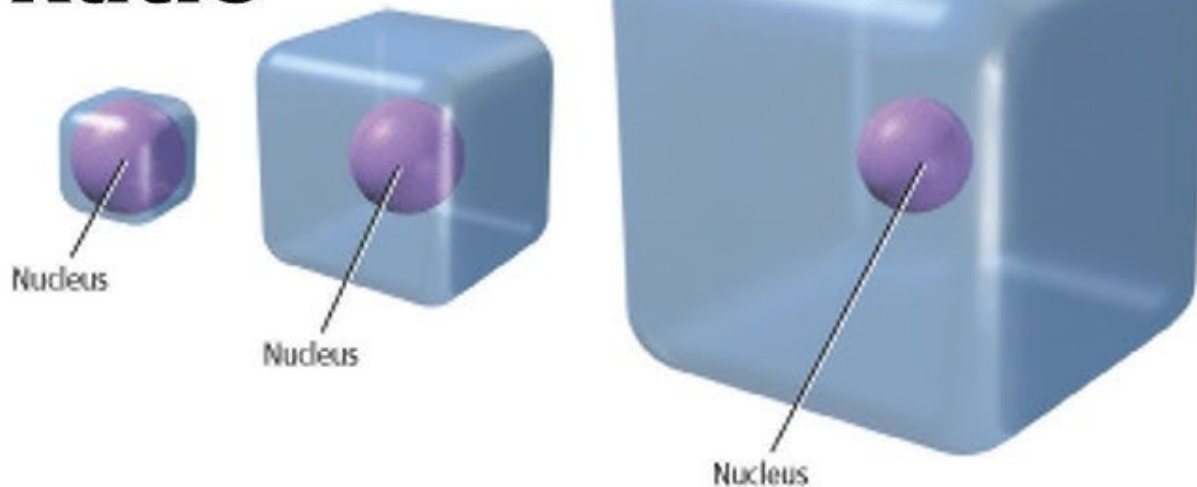
- ⇒ Increased Temperature
- ⇒ Increased Humidity: dec evaporation
- ⇒ High Intensity Exercise: increased metabolic activity
- ⇒ Restrictive clothing: dec evaporation
- ⇒ Sleep and/or Hydration Deficiencies / Caffeine
- ⇒ Lack of Acclimating
- ⇒ Increased Body Size



# Why Does Size Effect Risk?

Increase Work

**Surface Area to Volume Ratio**



# Is Cramping a Problem?

Cramping does not always correlate with overheating

It is more related to:

- Muscle fatigue
- Water loss
- Electrolyte loss

Some people are more prone to cramping than others.





# What to Do for Cramps?

## Prevention

- Proper training
- Stretching
- Acclimating

## Treatment

- Stretching
- Rehydration
- Rest
- Electrolyte Supplementation



# Heat Exhaustion

## Symptoms:

- Increased breathing and pulse
- Decreased blood pressure
- Dizzy
- Sweaty and pale
- Clammy
- Nausea
- Normal mental status



# Heat Exhaustion-Before they go Down

## Treatment – 6 Down's

- **Cool Down** –Shade/Fan
- **Strip Down** – Remove equipment/bulky clothes
- **Lay Down**
  - Elevate legs
- **Drink Down**-Hydrate
- **Look Up and Down**/Monitor – Temperature/Mental Status- Look for improvement with treatment
- **Call Down** – If doesn't improve see advanced care

**Withdraw struggling Athletes!**

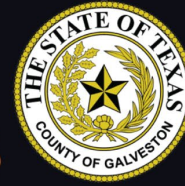
# Heatstroke

Most Severe Form.

Core Temperature **>104** (rectal or GI only) and Altered Mental Status\*

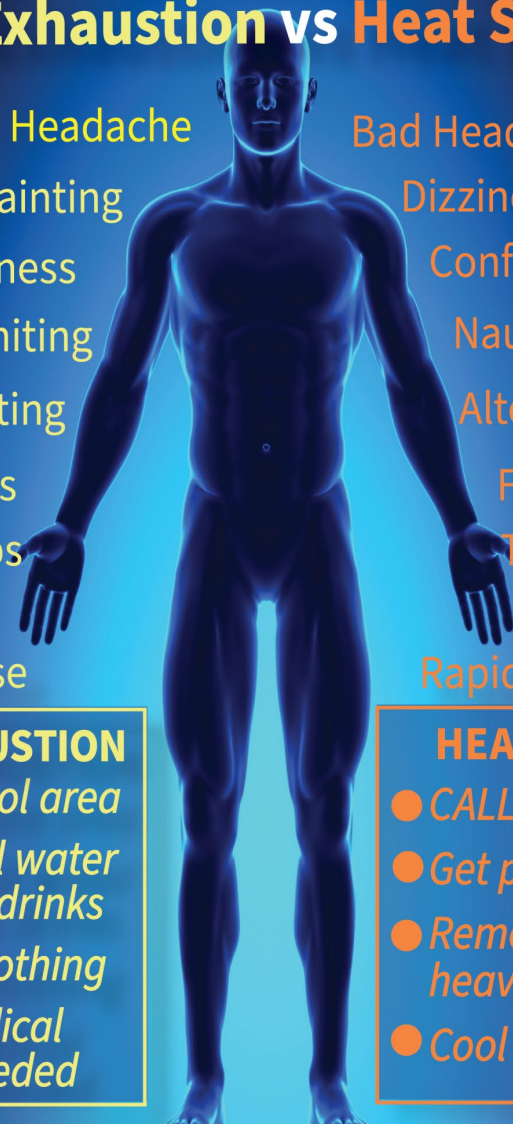
The length of time the core temp is above 104 strongly predicts outcomes.

## HEAT EMERGENCIES



**GCOEM.ORG**  
Galveston County  
Emergency Management

### Heat Exhaustion vs Heat Stroke

A blue-tinted illustration of a human body, showing the torso, arms, and legs, used as a background for the comparison table.

| Headache           | Bad Headache        |
|--------------------|---------------------|
| Dizziness/Fainting | Dizziness/Fainting  |
| Weakness           | Confusion ←         |
| Nausea/Vomiting    | Nausea/Vomiting     |
| Heavy Sweating     | Altered Sweating    |
| Paleness           | Flushed Skin        |
| Muscle Cramps      | Temp Over 103°      |
| Tiredness          | Unconscious         |
| Weak Pulse         | Rapid, Strong Pulse |

#### HEAT EXHAUSTION

- Rest in cool area
- Drink cool water or sports drinks
- Loosen clothing
- Seek medical care if needed

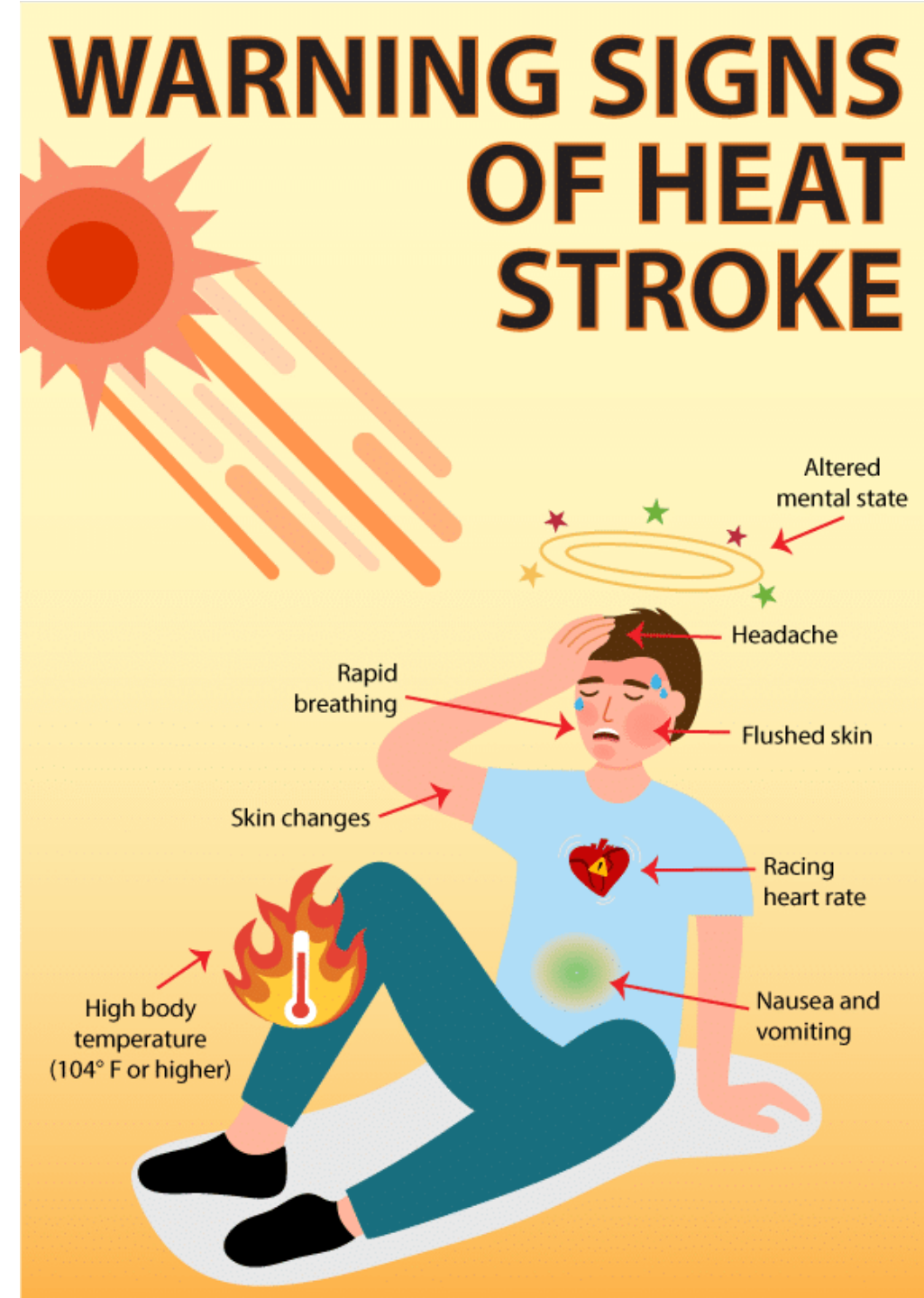
#### HEAT STROKE

- CALL 911
- Get person inside
- Remove excess or heavy clothing
- Cool down quickly



# Heatstroke Symptoms

- ⇒ Rectal Temperature  $>104$
- ⇒ Lack or Decreased Sweating
- ⇒ **Unconscious or altered Mental State**
- ⇒ Bad Headache
- ⇒ Dizzy
- ⇒ Nausea/Vomiting
- ⇒ Rapid Strong Pulse



# Heatstroke Treatment

Cold emersion is the gold standard

Cool and then transport

Remove from bath when you get below 102

Cold emersion decreases body temperature by one degree Fahrenheit every 3 minutes

Monitor vitals



# Heatstroke Treatment

Cool then Transport



Remove when you get below  
102





# Heat Illness Prevention



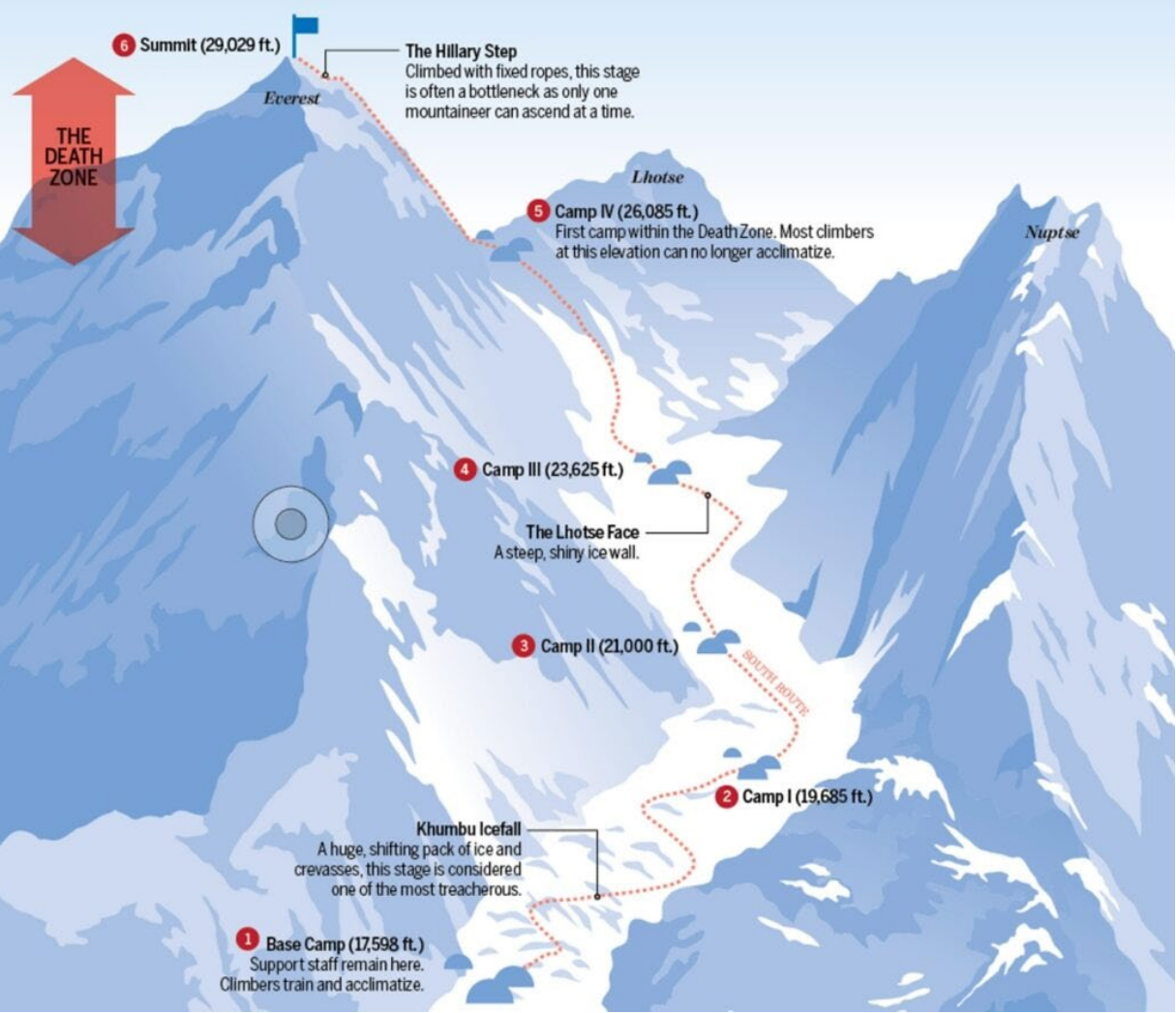
- **Monitor Temps/Humidity-practice in cooler times of the day**
- **Breaks and Hydrate with electrolyte replacement when warranted**
  - Start before practice
  - Frequent small amounts
- **Activities based off body size**
  - No exertion drills as punishment
  - Exclude lineman from high endurance/high output activities during the first few weeks. (serial sprints/long distance)
- **Appropriate clothes/equipment**
  - Adjust intensity and equipment for changes in temp/humidity.
- **Acclimate**



# Acclimate

# Acclimating for Everest





| Heat Stress Category (WBGT)                 | Moderate Work   |                       | Hard Work       |                                                |
|---------------------------------------------|-----------------|-----------------------|-----------------|------------------------------------------------|
|                                             | Work/Rest Cycle | Water Intake Per Hour | Work/Rest Cycle | Water Intake Per Hour                          |
| <b>White</b><br>≤76.9°F<br>(≤24.9°C)        | Base Camp       |                       |                 | 500 ml<br>(1/2 qt)                             |
| <b>Green</b><br>77-81.9°F<br>(25-27.7°C)    | Camp 1          |                       |                 | 1000 ml<br>(1 qt)                              |
| <b>Yellow</b><br>82-84.9°F<br>(27.8-29.4°C) | Camp 2          |                       |                 | 1000 ml<br>(1 qt)                              |
| <b>Red</b><br>85-88.9°F<br>(29.5-31.6°C)    | Camp 3          |                       |                 | Use is forbidden.<br>Risk for heat casualties. |
| <b>Black</b><br>≥89°F<br>(≥31.7°C)          | Camp 4          |                       |                 | casualties.                                    |



# Acclimating

- Should occur over the initial 7-14 days of practice.
  - Start with shorter less intense practices
  - Emphasize instruction over conditioning
  - Minimize protective gear
- Acclimating improves Heart stroke volume, sweat output, sweat rate, evaporation of sweat, and decreases heart rate, core temperature, skin temperature, and salt loss.
- Those that are less fit should have a modified practice to bring their conditioning up to the rest of the group.





# Acclimatization

## Preseason Heat-Acclimatization Guidelines

| Area of Practice Modification               | Practices 1-5                                                       |                                          | Practices 6-14                                              |
|---------------------------------------------|---------------------------------------------------------------------|------------------------------------------|-------------------------------------------------------------|
|                                             | Days 1-2                                                            | Days 3-5                                 |                                                             |
| # of Practices Permitted Per Day            | 1                                                                   |                                          | 2, only every other day                                     |
| Equipment                                   | Helmets only                                                        | Helmets & Shoulder Pads                  | Full Equipment                                              |
| Maximum Duration of Single Practice Session | 3 hours                                                             |                                          | 3 hours (a total maximum of 5 hours on double session days) |
| Permitted Walk Through Time                 | 1 hour (but must be separated from practice for 3 continuous hours) |                                          |                                                             |
| Contact                                     | No Contact                                                          | Contact only with blocking sleds/dummies | Full, 100% live contact drills                              |

NOTE: warm-up, stretching, cool-down, walk-through, conditioning, and weight-room activities are included as part of practice time

NATA guidelines

# Hydration

- **Free access to readily available fluids**
- **Regimented rehydration schedule 10/20 rule:**
  - 20 ounces 2 hours before practice
  - 10 ounce 20 minutes before
  - 10 ounces for every 10-20 minutes practiced (with a 10- minute break every 30 minutes)
  - 20 plus ounces after practice
- **No more than 3% of body weight loss during practice**
- **6% carbohydrate drinks can be helpful to delay fatigue**
  - Should be provided for events lasting more than 45 minutes.
- **Watch for “Salty Sweaters”**



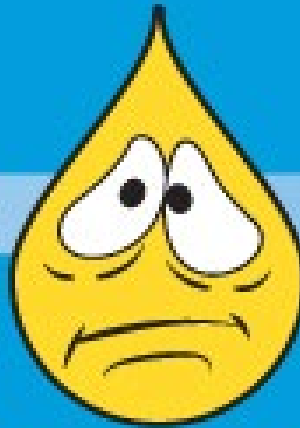
DEHYDRATION IS A LEADING CAUSE OF RUNNING INJURIES

# WHAT COLOR IS YOUR PEE?

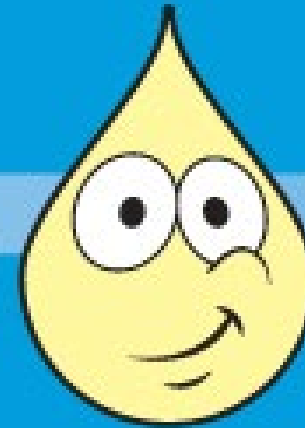
Gross, we know, but it's helpful.



YOU'RE RUNNING  
ON EMPTY!



HYDRATE ASAP  
OR CALL A RIDE!



READY  
TO RUN!

**WE RUN ON WATER**



RUN STRONGER.  
RUN LONGER.™

[nathansports.com](http://nathansports.com)

# Wet Bulb Globe Temperature

| Wet Bulb Globe Temperature (WBGT) from Temperature and Relative Humidity                                                                                                                                                                                           |                                   |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Relative Humidity (%)                                                                                                                                                                                                                                              | Temperature in Degrees Fahrenheit |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    |                                   | 68.0 | 71.6 | 75.2 | 78.8 | 82.4 | 86.0 | 89.6 | 93.2 | 96.8 | 100.4 | 104.0 | 107.6 | 111.2 | 114.8 | 118.4 | 122.0 |
|                                                                                                                                                                                                                                                                    | 0                                 | 58.6 | 60.9 | 64.3 | 65.5 | 67.7 | 69.9 | 72.1 | 74.3 | 76.4 | 78.5  | 80.6  | 82.6  | 84.7  | 86.6  | 88.6  | 90.5  |
|                                                                                                                                                                                                                                                                    | 5                                 | 59.6 | 62.1 | 65.6 | 67.0 | 69.3 | 71.7 | 74.0 | 76.4 | 78.6 | 80.9  | 83.1  | 85.3  | 87.5  | 89.9  | 92.1  | 94.2  |
|                                                                                                                                                                                                                                                                    | 10                                | 60.7 | 63.3 | 66.9 | 68.4 | 70.8 | 73.3 | 75.8 | 78.2 | 80.7 | 83.0  | 85.5  | 88.0  | 90.3  | 92.8  | 95.1  | 97.6  |
|                                                                                                                                                                                                                                                                    | 15                                | 61.7 | 64.5 | 68.1 | 69.6 | 72.2 | 74.8 | 77.4 | 80.0 | 82.6 | 85.2  | 87.8  | 90.2  | 92.8  | 95.4  | 98.0  |       |
|                                                                                                                                                                                                                                                                    | 20                                | 62.7 | 65.6 | 69.4 | 70.9 | 73.6 | 76.3 | 79.2 | 81.8 | 84.5 | 87.1  | 89.8  | 92.5  | 95.2  | 97.8  |       |       |
|                                                                                                                                                                                                                                                                    | 25                                | 63.8 | 66.7 | 70.5 | 72.2 | 75.1 | 77.8 | 80.6 | 83.4 | 86.2 | 89.0  | 91.8  | 94.6  | 97.4  |       |       |       |
|                                                                                                                                                                                                                                                                    | 30                                | 64.8 | 67.6 | 71.7 | 73.4 | 76.3 | 79.2 | 82.1 | 84.9 | 87.8 | 90.8  | 93.6  | 96.6  | 99.4  |       |       |       |
|                                                                                                                                                                                                                                                                    | 35                                | 65.6 | 68.6 | 72.7 | 74.6 | 77.5 | 80.5 | 83.5 | 86.4 | 89.4 | 92.4  | 95.3  | 98.3  |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 40                                | 66.7 | 69.6 | 73.8 | 75.7 | 78.8 | 81.8 | 84.8 | 87.8 | 90.9 | 94.0  | 97.0  |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 45                                | 67.5 | 70.6 | 74.8 | 76.8 | 79.9 | 83.0 | 86.1 | 89.2 | 92.3 | 95.4  | 98.6  |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 50                                | 68.4 | 71.5 | 75.8 | 77.8 | 81.1 | 84.1 | 87.4 | 90.5 | 93.7 | 96.9  |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 55                                | 69.3 | 72.4 | 76.7 | 78.8 | 82.1 | 85.3 | 88.5 | 91.9 | 95.1 | 98.3  |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 60                                | 70.1 | 73.3 | 77.7 | 79.8 | 83.2 | 86.4 | 89.8 | 93.1 | 96.3 | 99.6  |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 65                                | 70.9 | 73.8 | 78.6 | 80.9 | 84.2 | 87.5 | 90.8 | 94.1 | 97.5 |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 70                                | 71.7 | 75.0 | 79.5 | 81.7 | 84.9 | 88.6 | 91.9 | 95.3 | 98.6 |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 75                                | 72.4 | 75.9 | 80.3 | 82.7 | 86.1 | 89.6 | 92.9 | 96.4 |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 80                                | 73.2 | 76.7 | 81.2 | 83.6 | 87.1 | 90.4 | 93.9 | 97.4 |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 85                                | 74.0 | 77.4 | 82.0 | 84.5 | 88.0 | 91.5 | 94.9 | 98.5 |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 90                                | 74.7 | 78.2 | 82.9 | 85.3 | 88.9 | 92.3 | 95.9 | 99.4 |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 95                                | 75.5 | 78.9 | 83.6 | 86.1 | 89.6 | 93.2 | 96.8 |      |      |       |       |       |       |       |       |       |
|                                                                                                                                                                                                                                                                    | 100                               | 76.1 | 79.7 | 84.4 | 86.9 | 90.5 | 94.1 | 97.7 |      |      |       |       |       |       |       |       |       |
| NOTE: This chart is calculated using temperature and humidity, assuming a very clear sky (maximal solar load), and atmospheric pressure of 1ATA (760 mmHg). Chart A was developed by Professor Yoram Epstein to be used in Ariel's Checklist for hikers in Israel. |                                   |      |      |      |      |      |      |      |      |      |       |       |       |       |       |       |       |

| Heat Stress Category (WBGT)                 | Moderate Work   |                       | Hard Work                                                                   |                       |
|---------------------------------------------|-----------------|-----------------------|-----------------------------------------------------------------------------|-----------------------|
|                                             | Work/Rest Cycle | Water Intake Per Hour | Work/Rest Cycle                                                             | Water Intake Per Hour |
| <b>White</b><br>≤76.9°F<br>(≤24.9°C)        | 60/15 MINUTES   | 300 ml<br>(1/3 qt)    | 40/20 MINUTES                                                               | 500 ml<br>(1/2 qt)    |
| <b>Green</b><br>77-81.9°F<br>(25-27.7°C)    | 60/15 MINUTES   | 750 ml<br>(3/4 qt)    | 40/20 MINUTES                                                               | 1000 ml<br>(1 qt)     |
| <b>Yellow</b><br>82-84.9°F<br>(27.8-29.4°C) | 40/20 MINUTES   | 1000 ml<br>(1 qt)     | 30/30 MINUTES                                                               | 1000 ml<br>(1 qt)     |
| <b>Red</b><br>85-88.9°F<br>(29.5-31.6°C)    | 30/30 MINUTES   | 1000 ml<br>(1 qt)     | <b>Exercise is forbidden.</b><br><b>Very high risk for heat casualties.</b> |                       |
| <b>Black</b><br>≥89°F<br>(≥31.7°C)          |                 |                       | <b>Exercise is forbidden. Very high risk for heat casualties.</b>           |                       |



# NATA Guidelines

| WBGT (°F) | Activity Guidelines and Rest Break Guidelines                                                                                                                                                                                                                                    |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <82.0     | Normal activities: provide $\geq 3$ separate rest breaks of minimum duration 3 min each during workout.                                                                                                                                                                          |
| 82.0-86.9 | Use discretion for intense or prolonged exercise. Watch at-risk players carefully. Provide $\geq 3$ separate rest breaks of minimum duration 4 min each.                                                                                                                         |
| 87.0-89.9 | Maximum practice time = 2 h. For football: players restricted to helmet, shoulder pads, and shorts during practice. All protective equipment must be removed for conditioning activities. For all sports: provide $\geq 4$ separate rest breaks for minimum duration 4 min each. |
| 90.0-92.0 | Maximum length of practice = 1 h. No protective equipment may be worn during practice and there may be no conditioning activities. There must be 20 min of rest breaks provided during the hour of practice.                                                                     |
| >92.1     | No outdoor workouts, cancel exercise, delay practices until a cooler WBGT reading occurs.                                                                                                                                                                                        |

Source: NATA Position Statement: Exertional Heat Illness, Journal of Athletic Training volume 50, number 9 2015, Table 5

# Why Does All of This Matter?



# Head



# Concussions





# Concussions

Mild Brain Injury / Nerve Injury

Symptoms:

- Headache
- Sensitivity to Light and Movement
- Difficulty concentrating
- Memory Loss
- Emotional and Functional changes
- Dizzy or Balance issues
- Only 5% lose consciousness

Treatment is Activity Modification & Gradual Return

Usually resolved in 1 – 2 weeks

No return to play until symptom free



# Concussions

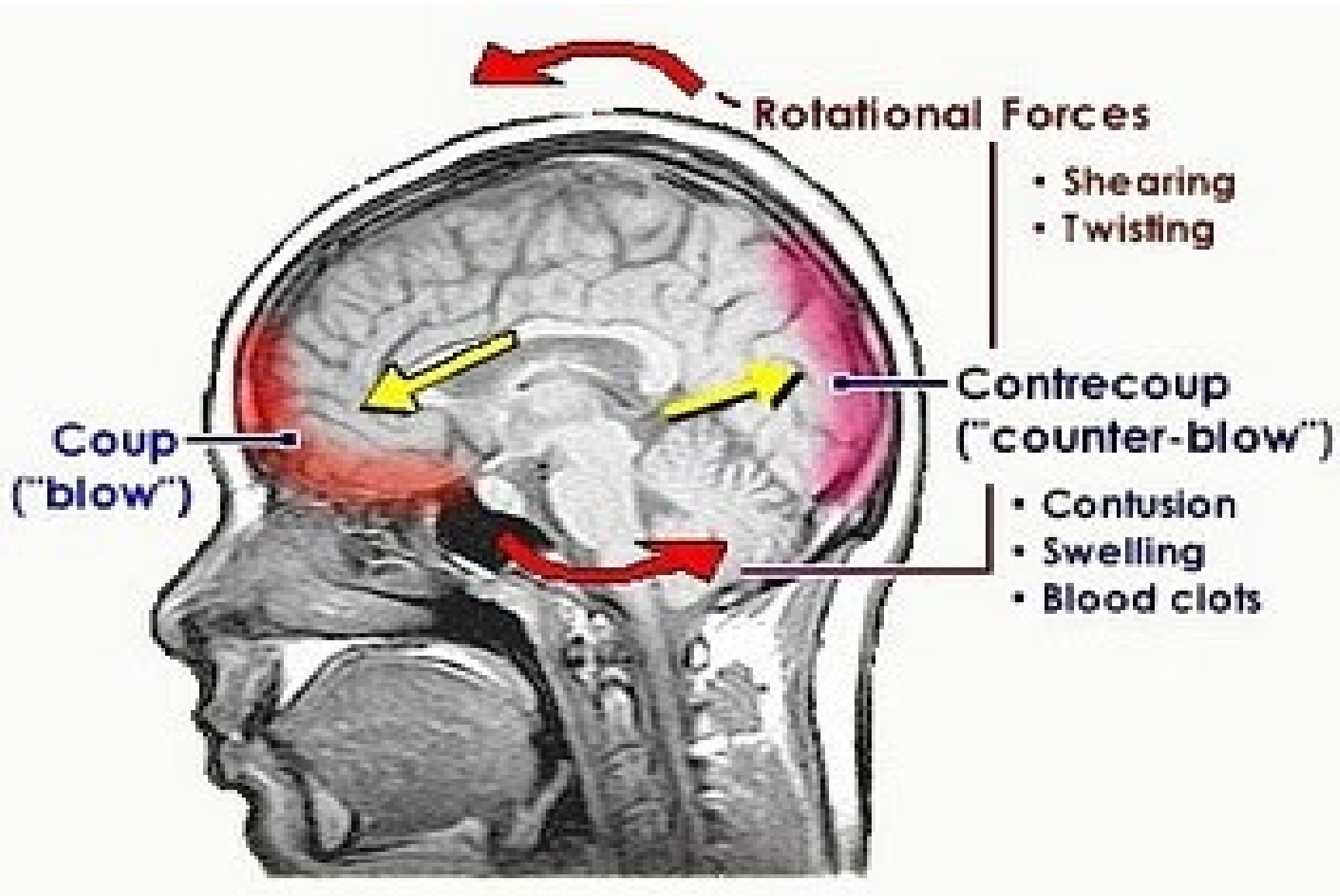


**Common  
Injury**

**Higher incidence  
in Females than  
Males**

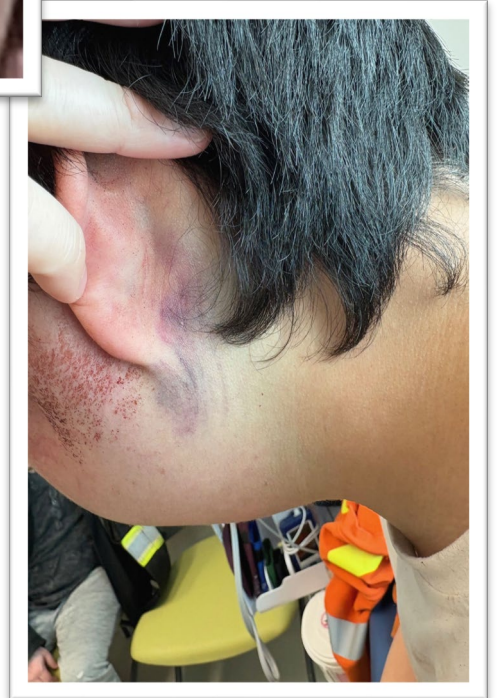
**Proper technique  
& eliminating  
high risk drills  
decreases risk**

# What Happens?



# When to Transport

- Facial Bruising
- Seizure
- Worsening symptoms
  - N/V
  - Neurological deficits or changing neuro function
  - Emotionally labile
- LOC or Amnesia





# Diagnosing Concussions

ImPACT

SCAT

BESS

VOMS

Child Sport Concussion Assessment Tool 6 - Child SCAT6™

## Step 2: Symptom Evaluation - Child Report (Continued)

Overall rating for child to answer:

On a scale of 6 to 18 (where 18 is normal), how do you feel now?

Very Bad 0 1 2 3 4 5 6 7 8 9 10 Very Good

If not 18, in what way do you feel different?

PLEASE HAND THE FORM BACK TO THE EXAMINER

Child Report: Total number of symptoms: of 21 Symptom severity score: of 63

## Step 2: Symptom Evaluation - Parent Report

PLEASE HAND THE FORM TO THE PARENT/GUARDIAN/CARER

| The Child...                                 | Not at all/never | A little/rarely | Somewhat/sometimes | A lot/often |
|----------------------------------------------|------------------|-----------------|--------------------|-------------|
| has headaches                                | 0                | 1               | 2                  | 3           |
| feels dizzy                                  | 0                | 1               | 2                  | 3           |
| has a feeling that the room is spinning      | 0                | 1               | 2                  | 3           |
| feels faint                                  | 0                | 1               | 2                  | 3           |
| has blurred vision                           | 0                | 1               | 2                  | 3           |
| has double vision                            | 0                | 1               | 2                  | 3           |
| experiences nausea                           | 0                | 1               | 2                  | 3           |
| gets tired a lot                             | 0                | 1               | 2                  | 3           |
| gets tired easily                            | 0                | 1               | 2                  | 3           |
| has trouble sustaining attention             | 0                | 1               | 2                  | 3           |
| is distracted easily                         | 0                | 1               | 2                  | 3           |
| has difficulty concentrating                 | 0                | 1               | 2                  | 3           |
| has problems remembering what he/she is told | 0                | 1               | 2                  | 3           |
| has difficulty following directions          | 0                | 1               | 2                  | 3           |
| tends to daydream                            | 0                | 1               | 2                  | 3           |
| gets confused                                | 0                | 1               | 2                  | 3           |
| is forgetful                                 | 0                | 1               | 2                  | 3           |
| has difficulty completing tasks              | 0                | 1               | 2                  | 3           |
| has poor problem-solving skills              | 0                | 1               | 2                  | 3           |
| has problems learning                        | 0                | 1               | 2                  | 3           |
| has a sore neck                              | 0                | 1               | 2                  | 3           |

Do the symptoms get worse with physical activity? Y N

Do the symptoms get worse with trying to think? Y N

Overall rating for parent/teacher/coach/carer to answer:

On a scale of 0 to 100% (where 100% is normal), how would you rate the child now?

If not 100%, in what way does the child seem different?

PLEASE HAND THE FORM BACK TO THE EXAMINER

Parent Report: Total number of symptoms: of 21 Symptom severity score: of 63

For use by Health Care Professionals only

British Journal of Sports Medicine



# Pre-Season Concussion Testing



**Can be helpful**

**Can be inaccurate**

Kids game the test

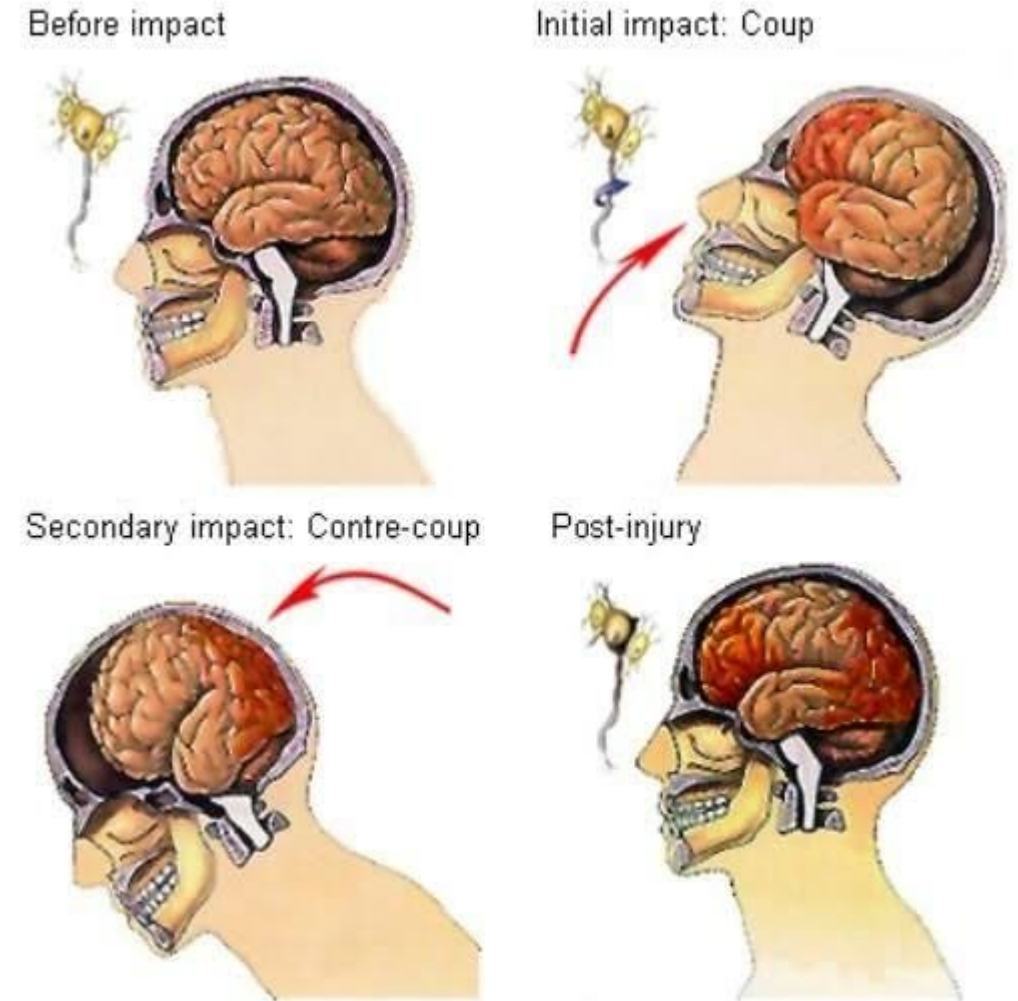
What is Normal?

**May be some bias to the testing**

**Mixed results within the literature**

# Second IMPACT Syndrome

- Second Injury to the brain while the patient is still symptomatic from the first concussion
- Leads to dysregulation of the cranial vasculature and rapid swelling
- Usually Fatal



# Treatment: Rest vs Activity

Grool et al in JAMA 2016 showed that early return to physical activity decreases prolonged symptoms by half



Vaughn et al in JAMA 2023 showed that early return to school did the same.



Increase activities till mildly symptomatic and then pull back.





# My Basic Questions?

Can you watch your phone or TV at home?

Can you look at your phone when riding in a car?

Do you get nauseous when riding in a car?

Can you concentrate at school or while doing homework?



# LHSAA Guidelines

- Remove from activity
- Referral to a provider
- Gradual Return to School Activities
- When symptom free start RTP protocol
  - Light aerobic exercise for 5-10 minutes
  - Moderate activity for 15-20 minutes
  - Non-Contact sports related activity.
  - Full Contact
- Get Return to Competition Form Completed to return.



# Symptoms >4 weeks: PCS (post concussion syndrome)



**Requires a team approach for treatment of the symptoms**

**Counseling**

**Psychology**

**PMR / Neurology**

**Vestibular Therapy**

# Long Term Effects



Lot to be learned

## CTE



- How many injuries?
- Accumulative?
- Does current interventions prevent this?

## Chronic traumatic encephalopathy (CTE)

Healthy brain

Advanced CTE



Cleveland Clinic © 2025



# Neck Injuries



## These come in all forms

- Proper technique can prevent most injuries
- Beware of recurrent “Stingers”
- Good evaluation on the field is essential
- Know how to manage these injuries, spine boarding protocols, and equipment removal recommendations
- Instruct players to not throw players off them as the get up.

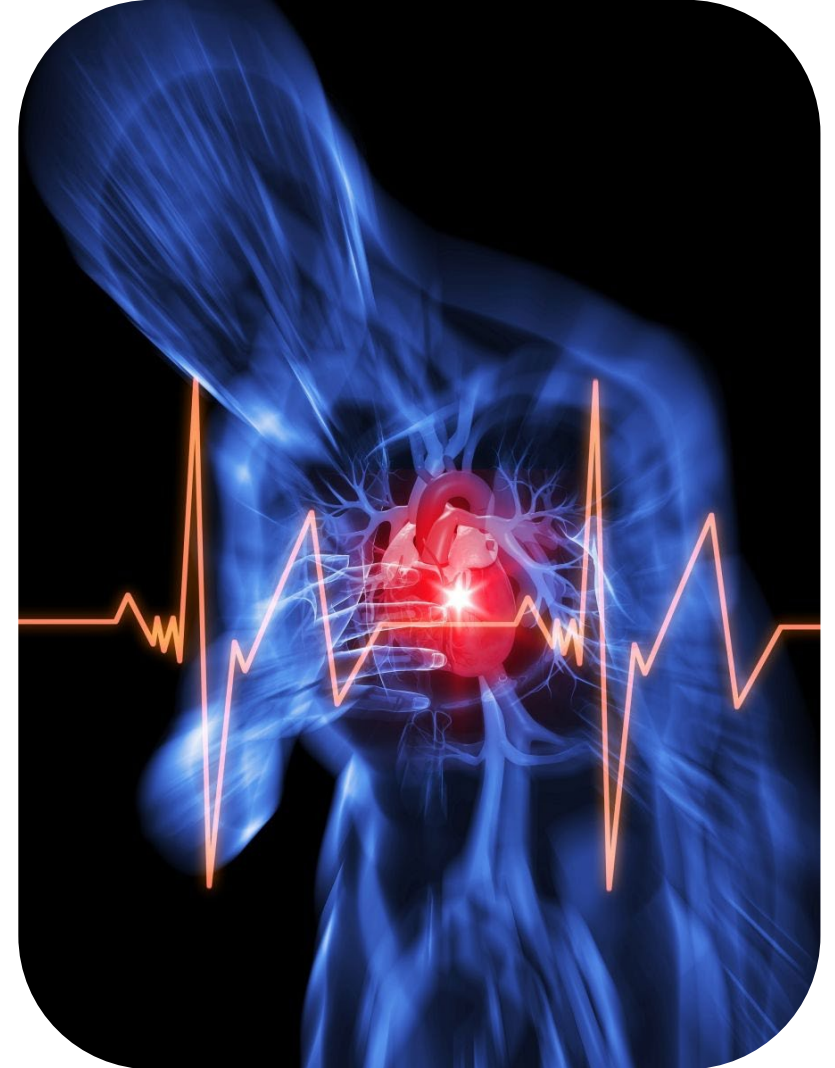


# Heart

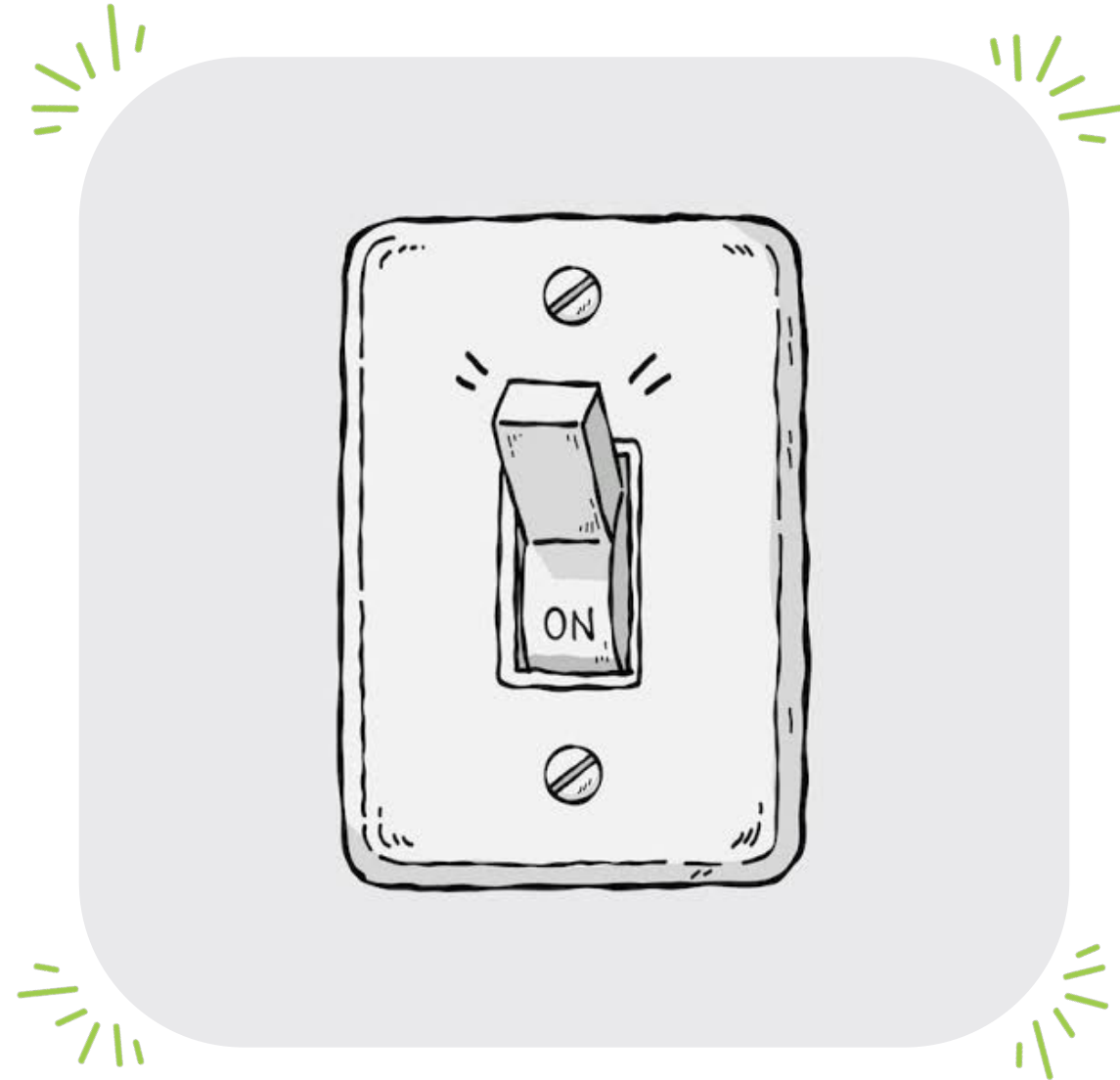
# Sudden Cardiac Death

Occurs in  
**1 in 7,000 to  
1 in 100,000**  
athletes

**80%**  
Are  
completely  
asymptomatic



# The Problem!





# Causes for High School Athletes



**Arrhythmias**

**Commotio  
Cordis**

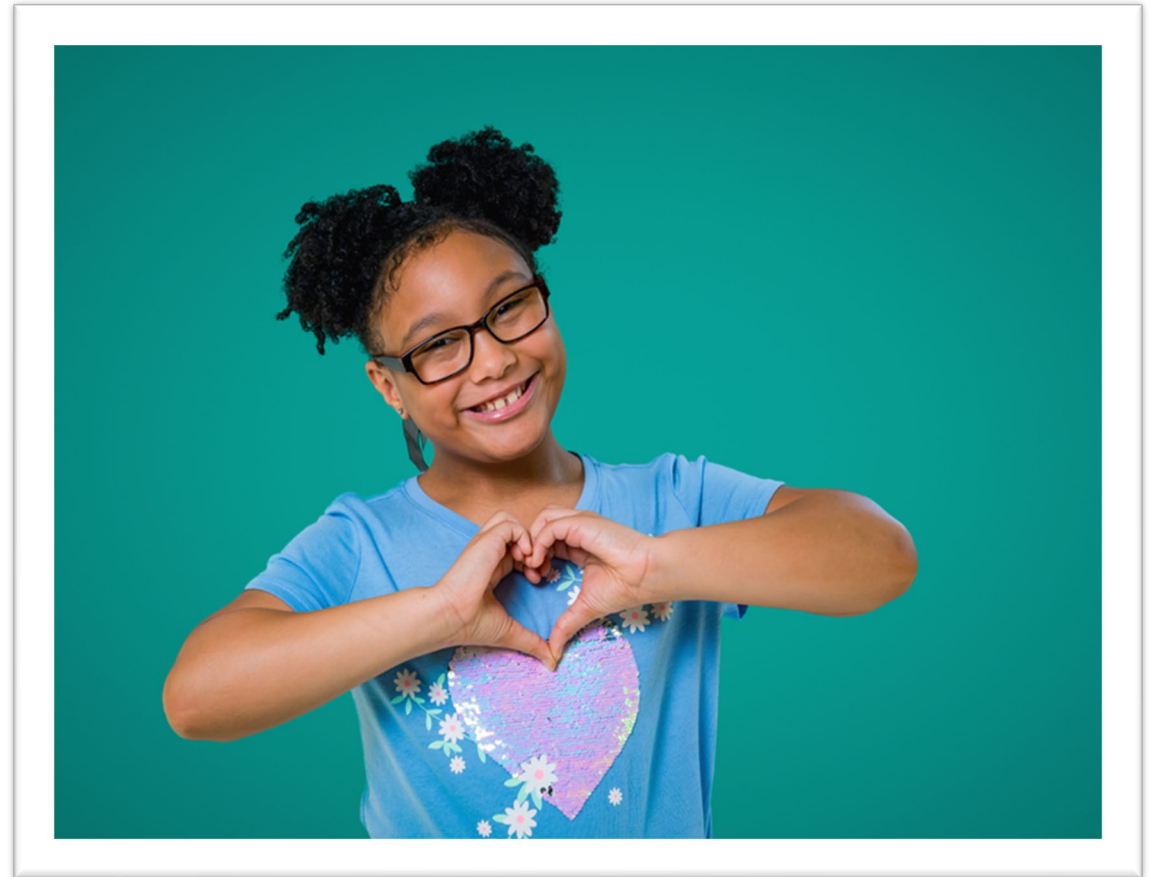
**Hypertrophic  
Cardiomyopathy**

**Viral  
Myocarditis**

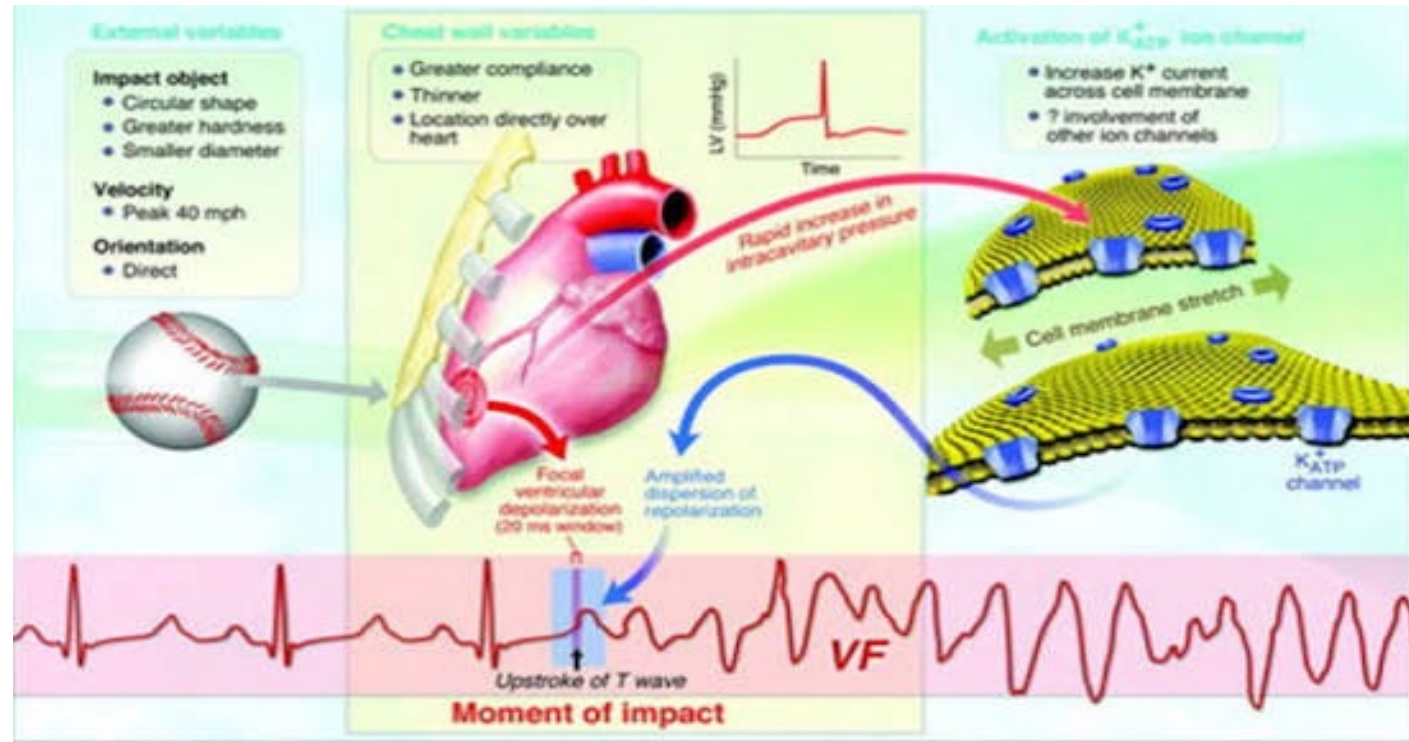
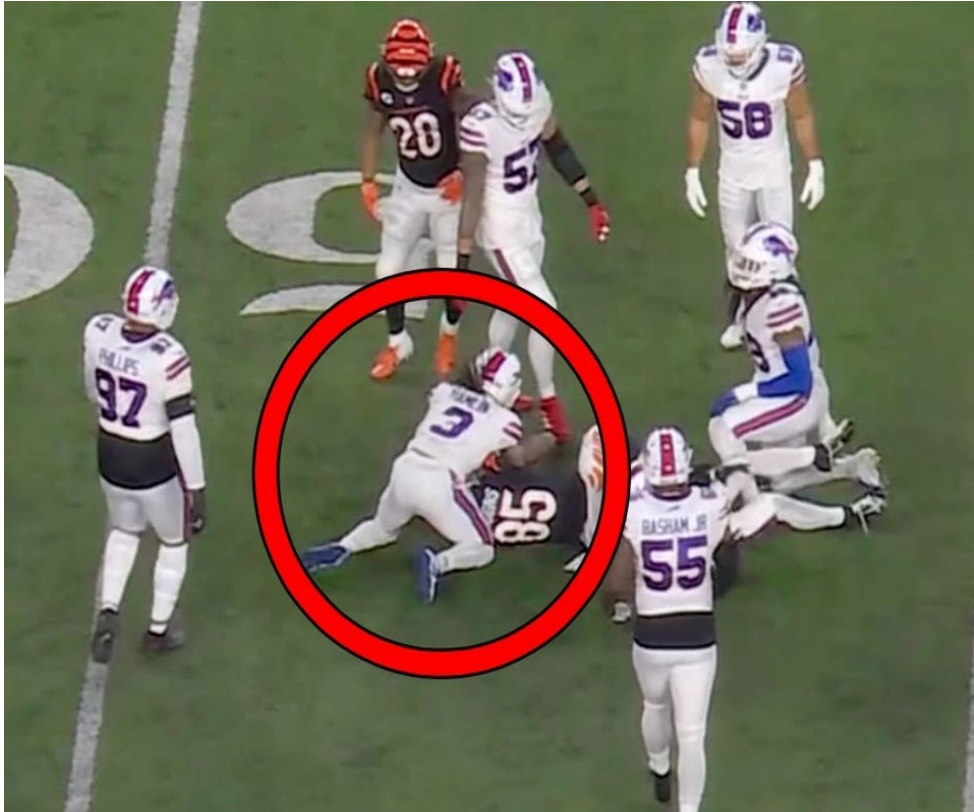
**Congenital  
Abnormality**

# History and Physical Testing

- Any Family History of Cardiac related early death?
- Fainting/Syncope
- Recent Covid infection
- History of Murmurs
- Hypermobility
- EKG vs ECHO



# Commotio Cordis



Source: <https://www.ahajournals.org/doi/full/10.1161/CIRCEP.111.962712>  
copyright American Heart Association

# Hypertrophic Cardiomyopathy



Strong family history



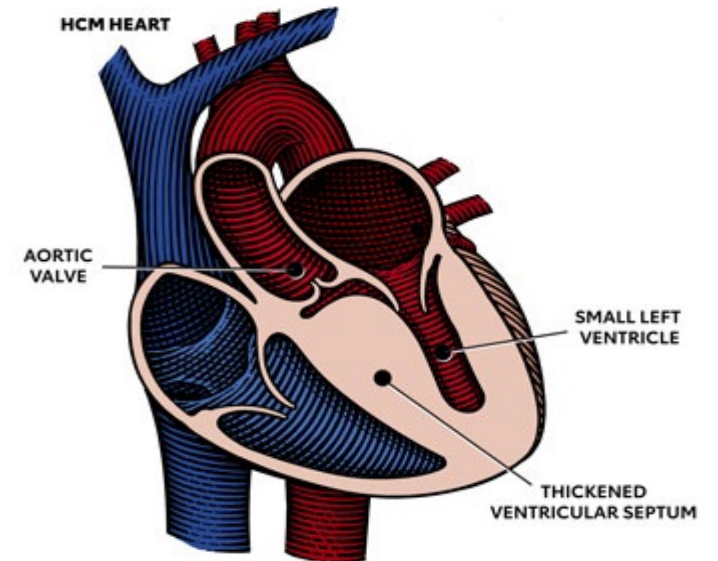
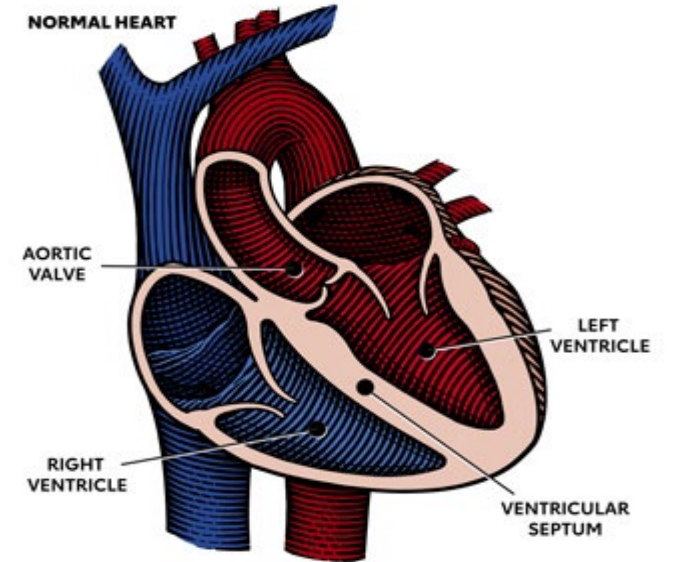
Long, large athletes



Almost always asymptomatic



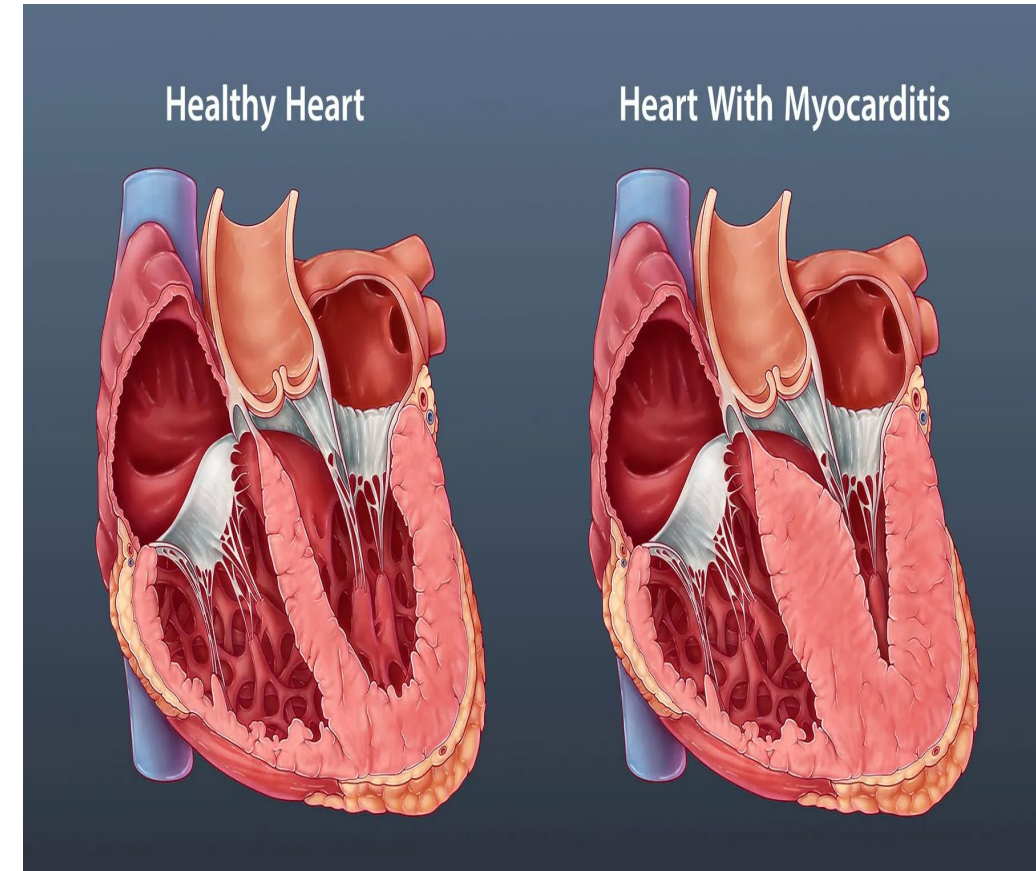
ECHO's are an important evaluation tool when suspecting this condition





# Myocarditis

- Uncommon Cause of Sudden Cardiac Death
- More Commonly occurs in males
- Almost always Post Viral with increased notoriety after COVID
  - Can occur with many viruses
- Patients with Chest Pain after a viral illness need to be evaluated.



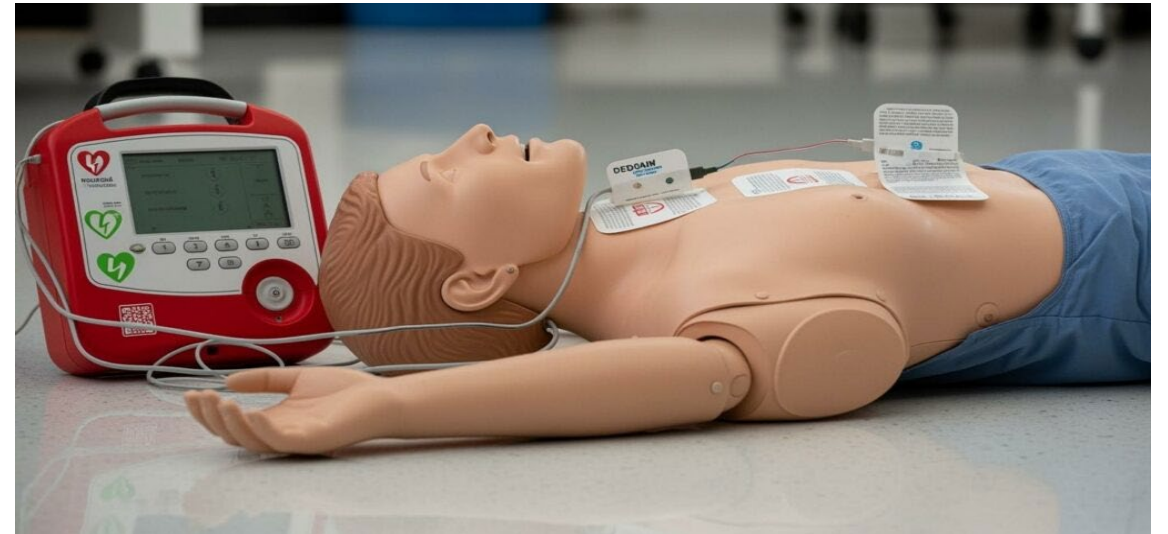
# CPR Training



CPR training saves lives!

AED use increases survival  
rates by  
**75%**

Use of the AED during the first  
**3-5 minutes**  
increases survival







# Walk On/Walk Off!



# Questions?

**Unlike any other.  
Undeniably for kids.**



**Manning Family  
Children's** LCMC Health



**Manning Family  
Children's**  
LCMC Health